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Piers et al.

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(54) MULTIFOCAL OPHTHALMIC LENS

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(58) Field of Classification Search

CPC A61F 2/1613; A61F 2/1616; A61F 2/1618; A61F 2/1637; A61F 2/164; A61F 2/1654 See application file for complete search history.

(56) References Cited

U.S. PATENT DOCUMENTS

3,722,986 A 3/1973 Tagnon 4,460,275 A 7/1984 Spriggs (Continued)

FOREIGN PATENT DOCUMENTS

EP 0037529 A1 10/1981 EP 335731 A2 10/1989 (Continued)

OTHER PUBLICATIONS

U.S. Appl. No. 11/734,238 Response to Restriction Requirement mailed Mar. 10, 2008, 12 pages total.

(Continued)

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(57) ABSTRACT

A method of designing a multifocal ophthalmic lens with one base focus and at least one additional focus, capable of reducing aberrations of the eye for at least one of the foci after its implantation, comprising the steps of: (i) characterizing at least one corneal surface as a mathematical model; (ii) calculating the resulting aberrations of said corneal surface(s) by employing said mathematical model; (iii) modelling the multifocal ophthalmic lens such that a wavefront arriving from an optical system comprising said lens and said at least one corneal surface obtains reduced aberrations for at least one of the foci. There is also disclosed a method of selecting a multifocal intraocular lens, a method of designing a multifocal ophthalmic lens based on corneal data from a group of patients, and a multifocal ophthalmic lens.

5 Claims, 4 Drawing Sheets

